

## ASTROPHYSICS

### **T Tauri stars in the Cepheus and Ophiuchus complexes**

supervisor: doc. Mgr. Štefan Parimucha, PhD.

study form: full time

Annotation: T Tauri type stars are young stars located near large molecular clouds. These objects are so-called pre-main sequence stars in the process of contracting to the main sequence. They also show optical variability and strong chromospheric lines. The main aims of the thesis are:

- ⑩ analyze long-term photometry of selected stars in both complexes obtained by SuperWasp and NSVS projects. If any strong periods and their changes will be detected, other photometric monitoring will be started
- ⑩ obtain and analyze spectroscopic observations and reveal binary nature of objects.

### **Extrasolar planets and brown dwarfs**

supervisor: RNDr. Ján Budaj, CSc. – Astronomical Institute of Slovak Academy of Sciences

study form: full time

Annotation: Brown dwarfs and extrasolar planets represent a modern field of research which is very dynamic. That is why the focus of the thesis may shift according the current situation as well as interest and activity of the student. Mainly the following areas will be considered and monitored:

- ⑩ disintegrating exoplanets-"exo"bodies on close orbits around their parent stars,
- ⑩ eclipsing stellar systems with dark dusty disks which may harbour planets  
(photometry and modeling of spectra and light curves)
- ⑩ reflection effect and albedo in interacting binaries and exoplanets (photometry and modeling)
- ⑩ transit timing variations and search for possible new exoplanets (photometry).

### **Rossiter-Mc Loughlin effect: tool to measure stellar obliquity.**

supervisor: RNDr. Theodor Pribulla, CSc. – Astronomical Institute of Slovak Academy of Sciences

study form: full time

Annotation: Rossiter Mc Loughlin (RM) effect is an essential modeling tool to determine orbital plane-spin axis misalignment in double stars and exoplanetary systems. The effect changes the observed radial velocity of a star when it is eclipsed. In rapid rotators the orbital plane-spin axis misalignment can directly be inferred from the line-profile changes. The orbital plane-spin axis misalignment records evolutionary history and strongly affects the apsidal-motion rate of eccentric systems. The RM effect will be studied using medium and high-resolution échelle spectroscopy of selected eclipsing binaries during eclipses. The data will be obtained with 60 and 130cm telescopes of the Astronomical institute of the Slovak Academy of Sciences.

### **Multi-frequency investigation of the symbiotic binary AG Draconis**

Supervisor: doc. RNDr. Rudolf Gális, PhD.

Study form: full time

Goals: The main goal of this PhD thesis is analysis of photometric and spectroscopic observations of the symbiotic system AG Draconis with a focus on study of its long-term variability and the physical mechanisms responsible for the observed activity of this interacting binary.

Annotation: Symbiotic systems belong to a group of interacting binaries, in which physical mechanisms related to the mass transfer and accretion are responsible for the observable activity of these eruptive variable stars. Variability of the symbiotic binary AG Draconis is characterized by alternating quiescent and active stages which consist of the series of individual outbursts repeating at about one-year interval. Exceptional amount of observations for last almost 130 years has

contributed to the clarification of a number of physical phenomena taking place in this object. Nevertheless, it remains much more for that their explanation and description still lie ahead. The main goal of this PhD thesis is study of photometric and spectroscopic data of AG Draconis with a focus on a creating of its consistent model and a deeper understanding of physical mechanisms responsible for the observed activity of this interacting binary.

Literatúra: Kenyon, S. J., 1986, The symbiotic stars, Cambridge University Press, Cambridge

Hellier, C.: 2001, Cataclysmic Variable Stars - How and Why they Vary, Springer, Chichester

Warner, B.: 1995, Cataclysmic Variable Stars, Cambridge University Press, Cambridge